

TOWN OF PLACENTIA REGIONAL WATER SUPPLY STUDY



Presented by: Progressive Engineering and Consulting
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1.0 INTRODUCTION:

- In 1994 Townside, Jersey side, Freshwater, Ferndale, Argentia, Southeast, Bond's Path and Dunville were amalgamated into the Town of Placentia.
- The present population is approximately 4500 – 5000 people with a significant number of transient workers to the Argentia and Long Harbour work sites.
- The amalgamation has resulted in several regional issues and the most recent issue being water quantity and quality which has prompted the need for water treatment. Water treatment in turn implies that a regional water supply must be sourced.

2.0 THE MANDATE:

- The economic outlook for the Town of Placentia looks very prosperous and the potential for growth is evident.
- In order to entice professionals and trades people to reside in your community then you require a full range of municipal services including clean drinking water.
- The Town of Placentia engaged Progressive Engineering and Consulting (PEC) to investigate the potential to develop a common water supply with sufficient water quantity and quality to supply the entire Placentia region. The demand for better water quality prompted the need for water treatment and a common water supply will make the water treatment initiative more attainable.
- Water Treatment is an expensive and complicated venture and part of this study is an informative session on water treatment technologies and the most applicable technologies for this specific application.

3.0 DESCRIPTION OF EXISTING WATER SUPPLY SYSTEMS:

- Clarkes Pond pumps water from a TWL of 42.1 m to 2 buried concrete reservoirs 418 and 1032 having TWL's of 76 m and 89 m respectively. 418 has a volume of 500,000 USGal and 1032 has a volume of 360,000 USGal.
- Clarkes Pond can provide 35 psi at the 63 m elevation and it presently services approximately 900 residents.
- Clarkes Pond also supplies domestic water and fire flows to the Argentia Industrial Park.

Clarkes Pond Controller and MCC



3.0 DESCRIPTION OF EXISTING WATER SUPPLY SYSTEMS cont'd

- Larkins Pond has a TWL of 40.7 m and it supplies water by gravity to lower Placentia. The Larkins Pond pumps deliver water to the 20,000 USGal Castle Hill reservoir having a TWL of 104m. The Blockhouse pumps deliver water to a concrete reservoir in Southeast Placentia having a TWL of 78.5 m.
- Larkins Pond can provide 35 psi at the 16 m elevation, the Castle Hill reservoir can provide 35 psi at the 80.5 m elevation and the Southeast reservoir can provide 35 psi at the 54 m elevation. The service population is approximately 2200 residents.

Larkins Pond Pumps and Generator



3.0 DESCRIPTION OF EXISTING WATER SUPPLY SYSTEMS cont'd

- Wyses Pond has a TWL of 85.9 m and it supplies water by gravity to Dunville through an Ozone and Sand Filtration system. The treated water is stored below the building in a concrete reservoir.
- Wyses Pond can provide 35 psi at the 61 m elevation and the service population is approximately 1300 residents.
- Clarkes Pond has a watershed area of 2.41 km² while Larkins Pond and Wyses Pond have watersheds of 1.8 km² and 0.65 km² respectively

Wyses Pond Ozone Generator



4.0 WATER QUALITY RESULTS:

- The Canadian Drinking Water Quality Guidelines outline the recommended minimum concentrations for potable water contaminants. A summary table is updated regularly on Health Canada's website.
- The goal of the CDWQG is to ensure that potable drinking water meets this minimum standard and that tragedies such as Walkerton (2000) and North Battleford (2001) are avoided.
- Clarkes Pond has superior raw water quality when compared to Wyses Pond and Larkins Pond.

Blockhouse Sodium Hypochlorite System



Clarkes Pond Exceedances

Parameter	DOEC Sample Period	DOEC Results		CDWQG
		Tap	Source	
Aluminum (mg/l)	May/2002-Aug/2013	0.0250-0.200		0
Alkalinity (mg/l)	May/2002-Aug/2013		11.00-21.00	No Guideline
Color (TCU)	May/2002-Aug/2013		26.00-48.00	15
pH	May/2002-Aug/2013			6.5-8.5
Turbidity (NTU)	May/2002-Aug/2013		0.40-0.90	1

Anomalies	
Aluminum	Sept/2001/0.69; May/2002/0.71, Otherwise less than 0.200 "Tap Water"
Color	Oct/2004/67, There were no compliances "Source Water"
pH	Oct/2002/6.3, Otherwise within CDWQG "Source Water"
Turbidity	Aug/2005/1.30, Otherwise within CDWQG "Source Water"

Larkins Pond Exceedances

Parameter	DOEC Sample Period	DOEC Results		CDWQG
		Tap	Source	
Aluminum (mg/l)	June/1989-Aug/2013	0.02-0.79		0
Alkalinity (mg/l)	June/1989-Aug/2013		8.80-14.00	No Guideline
Color (TCU)	June/1989-Aug/2013		18-34	15
Turbidity (NTU)	June/1989-Aug/2013		0.1-0.9	1

Anomalies	
Alkalinity	Oct/1993/2.60; May/1998/5.5; Oct/2003/17, Aug/2005/15: 3 Only 2 in Suggested Range "Source"
Color	Oct/1989 & May/1995/10: Oct/1997/13: Oct/2003/15: Only 4 compliances "Source"
pH	May/2003/6.3, Otherwise within CDWQG "Source"
Turbidity	Aug/2005/1.40: Jan/2006/1.60: Nov/2009/1.60: Otherwise within CDWQG "Source"

Wyses Pond Exceedances

Parameter	DOEC Sample Period	DOEC Results		CDWQG
		Tap	Source	
Aluminum (mg/l)	Feb/2000-Aug/2013	0.05-3.10		0
Iron (mg/l)	Feb/2000-Aug/2013	0.13-0.89		<.30
Manganese (mg/l)	Feb/2000-Aug/2013	0.00-0.13		0.05
Alkalinity	Feb/2000-Aug/2013	0.00-14.00	0.00-4.10	No Guideline
Color (TCU)	Feb/2000-Aug/2013	19.00-58.00	19-63	15
pH	Feb/2000-Aug/2013	5.1-7.1	5.3-6.4	6.5-8.5
Turbidity (NTU)	Feb/2000-Aug/2013	0.20-2.50	0.17-2.0	1

Anomalies	
Iron	There were 17 Exceedances in Tap Water
Manganese	Feb/2000/0.073 & 0.053: June/2001/0.130, Only 3 exceedances
Alkalinity	May/2011/40.00, Otherwise less than 14.00 "Tap Water"
Alkalinity	Aug/2005/11.00, Otherwise less than 4.1 "Source Water"
Color	Only 5 compliances in sample period. "Tap Water"
Color	16 compliances in sample period. "Source Water"
pH	Aug/1999/6.7; Sept/1999/6.5; Oct/1997/6.5 Otherwise less than 6.4 "Source Water"
Turbidity	Only 4 exceedances, 1.10, 2.50, 1.60 & 1.40 "Tap Water"
Turbidity	Jan/2006/2.0 : Jan/2012/1.2, Only 2 exceedances "Source Water"

5.0 WATER PRESSURE SERVICING LIMITS:

- The Clarkes Pond System and the Wyses Pond System presently function within 7 psi of each other.
- The Larkins Pond system presently provides a maximum of 68 psi to lower Placentia. This means that a PRV will have to be installed to limit the operating pressure to lower Placentia if Clarkes Pond becomes the regional water supply.
- The Castle Hill system operates at 21 psi higher than Clarkes Pond and must remain in Place.
- The Blockhouse system operates 53 psi higher than lower Placentia and must remain in place.

6.0 THEORETICAL DEMAND AND MEASURED FLOWS:

Water Supply	Sub Areas	Population	Average Daily Flow (Theoretical)		Peak Flow (Theoretical)		Measured (Actual) Flow	
			GPM	l/s	GPM	l/s	GPM	l/s
Clarkes Pond		900	56.14	3.54	214.95	13.56	319.85	20.18
	Freshwater	742	46.78	2.95	181.37	11.44	272.83	17.21
	North Argentinia	158	9.86	0.62	38.78	2.45	73.12	4.61
Larkins Pond		2696	168.41	10.63	586.21	36.98	977.13	61.65
	Ferndale/Jerseyside	583	36.18	2.28	142.54	8.99	153.32	9.67
	Placentia Proper	1712	106.04	6.69	385.93	24.35	823.81	51.97
	Southeast Placentia	401	25.57	1.61	102.73	6.48	61.97	3.91
Wyses Pond		1300	81.09	5.12	301.94	19.05	261.20	16.48
Totals		4896	405.43	25.58	1272.06	80.25	1558.18	98.31

Table 4: Theoretical versus Actual Flows.

THE REGIONAL WATER SUPPLY:

- Clarkes Pond has the lowest service population and the largest watershed of the 3 existing water supplies.
- When Gull Pond and Barron Pond are added to the Clarkes Pond watershed then the total regional watershed area increases to 5.8 km² which is approximately 1.0 km² larger than the combined areas of the original Clarkes Pond, Wyses Pond and Larkins Pond watersheds.
- Clarkes Pond was noted to have the best water quality.
- For these reasons, Clarkes Pond is recommended as the regional water supply.

7.0 AVAILABLE YIELD OF THE PROPOSED REGIONAL WATER SUPPLY

Watershed	Watershed Area (km ²)	Pond Area (km ²)	Pond Area (km ²)	Regional Demand (l/s)	Low Flow 50yr-30day (l/s)	Water Deficit (l/s)	Drawdown on Ponds (m)
	Combined	Individual	Combined				
Clarke's Pond - 2.41km ²	2.41	0.232	0.232	98.31	5	93.31	1.04
Gull Pond - Barron Pond - 2.41km ²	4.82	0.341	0.573	98.31	11	87.31	0.39
Larkin's Pond - 1.26km ²	6.08	0.319	0.892	98.31	12	86.31	0.25

8.0 REGIONAL WATER SUPPLY INFRASTRUCTURE REQUIREMENTS:

- Install a new PRV for lower Placentia. 5 existing to remain.
- Twin the watermain from Freshwater connection to 1032.
- Install 3 new flow meters. 5 existing to remain.
- 4 existing reservoirs to remain. Castle Hill and Freshwater Reservoirs to be replaced.
- Upgrade Clarkes Pond pumps, vfd's, intake and generator.
- Re-activate Argentia Pond for fire and process water.
- Connect Dunville watermain to Clarkes Pond.
- Connect Gull Pond and Barron Pond to Clarkes Pond.
- Establish Larkins Pond reverse pumping contingency plan.
- Install a new Water Treatment Plant.

9.0 CONSTRUCTION ESTIMATES:

PHASE 1:	
Freshwater Water System Replacement	\$4,666,400
Castle Hill Water Tank Replacement	\$439,750
PHASE 2:	
Freshwater - Direct Connection to Reservoir 418	\$687,250
New Flow Meters and SCADA Upgrade	\$552,300
Freshwater Water Tank Replacement	\$439,750
Dunville - Service Replacement Program	\$2,000,000
PHASE 3:	
Argentia Pond Fire Water System	\$1,578,400
Gull Pond - Barron Pond - Clarke's Pond Interconnections	\$1,596,400
PHASE 4:	
Clarke's Pond Intake and Pumphouse Upgrades	\$532,700
Clarke's Pond to Fewers Road Connection	\$1,531,150
Fewers Road to Station Road Connection	\$1,950,100
Sub-Total Infrastructure Projects	\$15,974,200
New Water Treatment Plant	\$12,500,000
Total	\$28,474,200



10.0 AVAILABLE WATER TREATMENT TECHNOLOGIES AND PRELIMINARY BUDGET

- The assessment of water treatment technologies has been bound separately in Appendix H.
- The assessment reviews 9 process treatment technologies and 5 disinfection technologies.
- Several combinations of the treatment technologies and supplementary processes are possible and this assessment describes each individual process prior to outlining the probable process treatment trains.



11.0 RECOMMENDATIONS AND CONCLUSION

- The Clarkes Pond – Barron Pond – Gull Pond watershed is a viable regional water supply.
- One central water treatment plant is more affordable than 3 independent plants.
- The total infrastructure works required to develop the regional water supply is estimated as \$15,971,150.
- The water treatment plant is estimated as \$12,500,000 for a total initiative cost of \$28,471,150.
- Several of the infrastructure works noted above must be completed regardless of whether or not water treatment is pursued in the future.



11.0 RECOMMENDATIONS AND CONCLUSION cont'd

- A phased approach to the infrastructure works is recommended and the actual phasing will require the input of council and staff.
- Argentia Management Authority and its tenants should be approached to reactivate Argentia Pond or contribute to the Town's share of this overall initiative.
- The water treatment assessment suggests that the following process treatment streams are most suited to Placentia's application;



11.0 RECOMMENDATIONS AND CONCLUSION cont'd

- Coagulation/Flocculation – DAF – MF/UF - UV.
- Coagulation/Flocculation – MF/UF - UV
- MF/UF – Nano Membrane – AC - UV.
- The next step in the water treatment initiative will be to confirm MIGA policies at that time. Presently there is a move toward 'design-build RFP's' but the process for the Marystown WTP involved a short listing of technologies, piloting and then an RFP for the design-build of the preferred technology. Ministerial approval of the RFP process is required.

11.0 RECOMMENDATIONS AND CONCLUSION cont'd

- Over the next 4 – 6 years the Town of Placentia should attempt to complete all of the infrastructure upgrades that are required irrespective of water treatment. This will provide more time to determine if the regional water supply is attainable and if the need still exists.
- The next step in the water treatment initiative will be to confirm MIGA policies at that time. Presently there is a move toward 'design-build RFP's' but the process for the Marystown WTP involved a short listing of technologies, piloting and then an RFP for the design-build of the preferred technology. Ministerial approval of the RFP process is required.

Question and Answer Period:

